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Risk analysis in suicide bioterrorism

Jason D Söderblom assesses the posed by the convergence of biological terrorism and suicide attacks

Governmental responses to bioterrorism seem limited to searching for biological agents at airports and shipping container entry points, and promoting bio-hazard awareness at mail handling facilities. In the wake of successful suicide terrorist attacks in Israel and Iraq, and given the success of suicide terrorist hijacking, a logical extension of the suicide attack phenomenon is to expect self-contaminated suicide terrorists to present a bioterrorist threat.

Defining the bioterror threat

Biological terrorism can be loosely categorised based on the agent used. First are biological toxins — sometimes referred to as 'bio-toxins' — poisons that are produced by living organisms. Examples include botulinum, staphylococcus enterotoxin, aflatoxin and shigella toxin. A bio-toxin consists of an amino-acid chain of several hundred peptides to several thousand proteins. However, some organic compounds, which are not peptides, can also be classed as toxins.

Gorka and Sullivan make the point that, in nature, bacteria, fungi, algae, plants, and animals produce a substantial range of toxins with a potential to be more lethal than the greater magnitude of nerve agents.¹ Moreover, type-A botulinum toxin (BTX), with a mean lethal dose estimated to be as low as a few tenths of a microgram, has been described as "the most lethal substance known".² BTX could surpass the lethality of a nuclear explosion in terms of the potential number of casualties.³

The second category is the 'virus threat'. Examples include smallpox, influenza, dengue fever, yellow fever, Rift Valley fever and haemorrhagic fevers like Lassa, Ebola, and Marburg. Smallpox spreads directly from person to person, primarily by droplet nuclei expelled from the oropharynx (the space beneath the mouth cavity) of the infected person, or could be disseminated by aerosol spray. Natural infection occurs following implantation of the virus on the oropharyngeal or respiratory mucosa. Exposure to smallpox could therefore occur through inhalation of an aerosol or exposure to a 'suicide carrier'.

Smallpox symptoms include fever, vomiting, headache and backache; after two to four days skin lesions appear.⁴ Smallpox is thought to be fatal in approximately 30% of people who have never been vaccinated. This risk is further exacerbated by the fact that medical practitioners can easily mistake smallpox for chicken pox.⁵ People with smallpox are not infectious during the incubation period; those afflicted are most infectious during the first week of severe illness, for this is when the largest amount of virus is present in saliva. This non-contagious period explains the effectiveness of the containment of cases during the global eradication programme. Importantly, post-exposure vaccination can prevent smallpox even after exposure to the virus. In the 20th century, naturally occurring smallpox killed approximately 300 million people.⁶

The third category of bio-threat is bacteria, including anthrax, plague, cholera, brucellosis, typhoid fever and rickettsial agents such as typhus, Rocky Mountain spotted fever and Q-fever. Brucellosis (of which Crimean fever is a form) is delivered through inhalation of aerosols or by ingestion via sabotage of the food supply.⁷ Cholera is delivered by ingesting contaminated food or water. Brucellosis is delivered by ingestion, inhalation of aerosols, or sabotage of the food supply. Glanders and melioidosis are delivered by inhalation of aerosols. Tularemia is delivered through inhalation or ingestion of aerosols or contact with a tick or other tularemia-infected arthropod or animal. Q-Fever is delivered by inhalation of aerosol or ingestion.

The effectiveness of the bioterror threat

Problems with delivering a bio-attack are the acknowledged Achilles' heel in biological warfare.⁸ Wind-patterns, air temperature, rain, and the presence of ultraviolet light can affect the mortality rate from a bioterror attack and the life span of the bio-organism.⁹ Unlike conventional warfare, a reliance on the 'luck and favour of the natural elements' is a logistical problem for both the terrorist in ensuring maximum casualties and the victim state in guarding against a bioterror attack. While a victim state can generally regulate and monitor the use of crop-dusters over open-roofed stadiums, it remains impossible to regulate the wind blowing across the top of the stadium. Wind carrying a bio-agent released two kilometers away is exceptionally difficult to take counter-measures against, yet this uncertainty cuts both ways, for if the wind-speed dies down, the attack could be a non-

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event, and the potential for containment of the bio-weapon is greatly improved. Hence bioterrorism may appear fraught with a complex problem surrounding the question of how to effectively deliver the attack. Yet this uncertainty would be greatly reduced through using suicide terrorists to deliver the biological agent.

It's all in the delivery: suicide bioterrorism

It remains effectively impossible in a democracy to prevent a suicide bioterrorist from entering a public space, such as an airport, stadium, school, grocery store, or shopping mall and spreading a bio-agent before the symptoms become apparent. A scenario to demonstrate my case is illustrated below. It will comprise a bacteria threat (pneumonic plague) as an initiator piggybacked with a virus threat (smallpox), and will also entail the targeting of a democracy and the use of suicide terrorists to deliver the agents.

Scenario: plague (bubonic, pneumonic, septicaemic)

Currently there is no widely available 'rapid' confirmation diagnosis test to identify plague.¹⁰ Confirmatory tests can be done through blood and sputum (if pneumonic), bubo aspirates (if bubonic) and central spinal fluid (if meningitis occurs). Antibiotics are an effective treatment, but waiting for lab results before starting the treatment is, according to Pamela Weintraub, effectively a "death sentence".¹¹

Bubonic plague is contracted through the bite of a flea or through handling infected animals. Thus the bubonic plague is not very practical for suicide bioterrorism, whereas pneumonic plague is widely considered to be a more practical option. Yet for suicide bioterrorism, this remains somewhat impractical as those suffering from pneumonic plague are visibly sick within one to six days and thus can be quickly identified and removed from the community. This is not to suggest that forms of the plague would not cause havoc and a considerable number of deaths. A suicide pneumonic plague terrorist would not look out of place in a hospital ward or a local GP's surgery. The suicide pneumonic plague carrier will not be seeking to be positively diagnosed with the plague, but will be relying on the 'flu-like symptoms' to remain undiagnosed as pneumonic plague. It is often assumed that the 'visible sickness' of the plague-infected terrorist would make plague-based bioterrorism easily detected, but pneumonic plague would be an effective tool in a two-tier (piggyback) terrorist attack.

Terrorists' ability to acquire plague

Pamela Weintraub states: "Experts in bioterrorism consider the plague a serious threat. Not only is it highly fatal and contagious, it is also stored in microbe banks around the world."¹² In the 1950s and 1960s there were many institutions and thousands of scientists working with plague. It thus remains proba-



Intelligence experts are concerned that terrorist groups may be able to gain access to the smallpox virus (left).

ble that this expertise could be purchased at any time, given the level of poverty in countries of the former Soviet Bloc.¹³ It is feasible that terrorist networks could acquire plague samples with minimal effort and if the suicide terrorist remains undetected around the target, he would succeed in causing havoc even if aerosolising equipment could not be acquired.

In May 1995, Larry Wayne Harris, a member of the anti-government 'Christian Patriots' and a former member of Aryan Nation, a neo-Nazi organisation, ordered samples of *Yersinia pestis*, the causative agent of the plague, from the American Type Culture Collection.¹⁴ Harris, a microbiologist, said he feared an "imminent invasion of Iraqi super-germ-carrying mice", and purported to be researching a "plague antidote". The US Centers for Disease Control and Prevention has since tightened up requirements for shipping special disease agents and toxins, such as bubonic plague, tularemia and brucellosis. Yet this lax security in the U.S before 1995, and the lax security that continues today in the former USSR, shows that the possibility of terrorists acquiring the plague is real.¹⁵

Terrorists' ability to acquire smallpox

Intelligence agencies and international relations scholars are concerned that Russian researchers of the former Soviet Biopreparat, of whom many have been unemployed since the 1990s, could be tempted to smuggle and sell smallpox to those terrorist groups with the financial resources and microbiological expertise to use it or further weaponise it. Marvin Cetron, president of Forecasting International Ltd, a risk assessment company working with both the US Department of Defense and the FBI, has stated, "I think the chance is about 80% of terrorists obtaining smallpox."¹⁶

States' ability to counter and contain

To use Australia as an example, routine vaccination against smallpox was introduced in Australia in 1917 because of an epidemic in New South Wales. However, by the 1950s in most parts of Australia vaccination was only mandatory people for travelling overseas or for

medical students, nurses and others at potentially greater risk of exposure. And vaccination was no longer required for any Australian following the global eradication of smallpox in the 1970s. The World Health Organization (WHO) reported that the last smallpox death occurred in 1977 and announced its worldwide eradication in 1979. As a result, most countries ceased vaccination against smallpox decades ago.

Testing the scenario

Two 'suicide pneumonic plague infected terrorists' strategically target numerous doctors' offices (in winter) to obtain a medical certificate to explain their absence from work — they could even leave before seeing the physician. They blend in with people suffering flu symptoms in the waiting room but are already effectively spreading the pneumonic plague amongst staff and patients.

A terrorist organisation claims responsibility for the plague outbreak. Citizens are too terrified to seek medical attention, as they are now aware that medical facilities have been targeted. This is when the second stage of the bioterror attack occurs. Smallpox is delivered to the target city through aerosolised delivery or by means of another infected set of suicide terrorists passing on smallpox through exhaled droplets.

Mass terror is created by the paradox that smallpox needs to be contained and treated, yet the mass plague (and smallpox) infection of patients and staff at hospitals causes citizens to stay away from medical facilities. A radio talk show host ponders aloud whether by attending the doctor to get checked for the flu, or vaccinated for smallpox, you may acquire both the pneumonic plague and smallpox before the vaccination takes effect.

Large segments of the community avoid medical treatment. The strain placed on the infrastructure of the city brings it to a halt, aircraft do not arrive or leave, police at roadblocks turn back fleeing residents, and the 'terror' caused by the bioterror attack is unmatched by any previously experienced health catastrophe. The economy is brought to a standstill, and the bioterrorists now have political influence as they have demonstrated their capacity to inflict terror. Worse still, a rumour circulates that the smallpox is a weaponised variant from the former USSR for which there is no vaccine. Thus the containment of infected people proves to be impossible, even though WHO vaccines arrive quickly. People are too frightened to leave their homes and there are simply not enough respirator masks to go around.

Risk analysts are aware that policymakers respond quickly to visible crises, even if the baseline rate of danger has not altered.¹⁷ In the event of a bioterror attack, schools, hospitals, police, government agencies and the public will need to engage in unprecedented

levels of trust and co-operation. Strict policies will be needed to mitigate and contain the crisis. Once a serious bioterror attack has occurred, the existing infrastructure of society would not easily cope with the scenario detailed in this article and containment would most probably fail.

This proposed scenario is logically feasible and has the potential to inflict greater death and terror than the 'Dark Winter' bioterrorism smallpox exercise conducted in 2003, given the piggyback strategy employed.¹⁸ Worse still, the scenario introduces smallpox of a weaponised variant; this may render the existing WHO smallpox vaccine ineffective, no matter how quickly it is administered.

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This article is also found at <http://world-ice.com/Artides/Bioterrorism.pdf>

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